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Regulators as an Interest Group

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Modeling the regulatory process as a scheme for wealth redistribution is no longer a novelty. Indeed, the view that the basic stake involved is a transfer of wealth has been central to recasting the paradigm of economic regulation. This article falls within that analytical tilt, but with three extensions that we shall summarize at the outset.

We formulate a model of political decision making in the context of price-entry regulation which explicitly treats regulators as one of the interest groups seeking to capture wealth transfers.[1] This treatment has only been implicitly integrated (if at all) into previous formulations, most of which stress the rivalry among other interest groups in the polity (for example, producers versus consumers) in vying to achieve benefits or to mitigate losses. Regulators, politicians, and producers have thus been depicted as bedfellows more than adversaries, squaring off against consumers or other producers in the political-regulatory process.[2] Regulators in our model aspire to get a piece of the action beyond the simple election or reelection aims that have motivated the decision-making problem as previously specified (for example, Peltzman, 1976). The incorporation of an underlying wealth-maximizing goal to regulators amounts to adding a common denominator to the interest group theory of regulation and to emphasize that regulators—qua interest group—constitute an important third party that must be reckoned with if we are to accurately portray the gains and losses of the political redistribution of wealth. Stated differently, from the standpoint of the n-1 nonregulator interest groups who find it economical to vie for transfers through the regulatory process, the total wealth which is redistributed may not be a zero sum game. Regulators in our model constitute an interest group, not differently motivated than other interest groups, who seek to achieve positive payoffs from the rechanneling of wealth through the political-regulatory process.

The second purpose of the article is to expand on the generality of a first principle suggested by Stigler (1971) and formally reiterated by Peltzman (1976): that the "political equilibrium will not result in the monopoly or cartel maximizing price" (p. 223). Our model suggests that this principle is not only independent of campaign or organizational costs (Peltzman's message), but it also holds when extraelection means such as bribes and conflicts of interest are influential factors in regulator decision making.

The third objective is to compare the impact of different institutional settings on a variety of regulatory outcomes. For example, in light of our analytical model we reexamine a paradox previously posed by Stigler (1972, 161):

> The simultaneous granting of regulatory benefits and levying of taxes poses an obvious question: if the industry has sufficient political power to obtain a state-supported cartel, why cannot the industry avoid becoming the object of selective excise taxation?

Finally, we offer some empirical evidence on our extended version of the interest group approach to regulation, and we offer evidence that the organization form of regulatory commissions affects regulated rates of return and prices.

The Model

There are three homogeneous groups—producers, consumers, and regulators—seeking benefits and avoiding losses from regulation. The regulators or political decision makers provide these gains and losses by setting regulated prices and the amount of tax (if any), together with control over entry. Each of the individuals in these groups is assumed to be a wealth maximizer, and each seeks to use the political process to do so.

The Regulator's Goal: Majorities versus Taxes

The choice problem is formulated from the standpoint of the regulator, whose wealth depends upon election as well as extraelection payoffs. This regulator seeks to maximize

$$W = W(M, T), \tag{1}$$

where

W = regulator's wealth,
M = size of electoral majority, and
T = all costs, legal or illegal, *broadly defined* to include taxes, bribes, campaign contributions, and so forth which might be imposed on regulated industries.

The taxes argument is general and includes all costs stemming from government regulation including, for example, campaign contributions. It also includes taxes paid to government general funds, some of which may be captured by the regulator through his budget share. T may also represent bribes from producers which are directly pocketed by the regulator. The T argument is any cost paid by the regulated industry associated with political influence. In the cases that follow the exact types of cost included in the argument will be made explicit. W_M and W_T (throughout the article subscripts refer to partial derivatives) are both greater than zero.

How Majorities are Gained and Lost

M is a majority-generating function which depends upon three factors: consumer support, producer support, and the acceptance of bribes or illegal contributions. This function is specified as

$$M = M(P,R,T) \tag{2}$$

where P is the producer's regulated price and R is producer return, net of taxes. Lower prices mean greater consumer support in elections whereas higher returns translate into more electoral support from producers, so $M_P < 0$, $M_R > 0$, and we assume that the marginal rate of substitution is diminishing.

The sign of M_T is more complex since it depends on the exact type of tax. When a regulator accepts taxes in the form of *illegal* bribes or contributions, we assume that voters are alienated so that his probability of election is reduced or that his probability of being removed from office is increased, so $M_T < 0$. Of course, there may be other more costly risks through legal sanctions such as fines or jail terms. For our purposes it is sufficient to enter the negative effects of bribes through the wealth reduction associated with losing political office. The *acceptance* of a *legal* contribution does not change a politician's election prospect. When the T argument represents taxes paid into the general fund, two possibilities are plausible. If voters perceive that these taxes increase bureau size and salaries, then industry taxation is an opportunity cost to the general taxpayer, and $M_T < 0$. Alternatively, when regulators substitute industry taxes for personal taxes of voters, then the politician's election prospect is enhanced; here $M_T > 0$.

Legal and Illegal Taxation

The range of taxes and bribes is determined by the profit frontier in the individual industry. Thus the exogenous demand and cost conditions in the industry combined with the net returns to the producer group place a constraint on the range of potential taxes, which is expressed as

$$R = \pi - T. \tag{3}$$

The returns to the producers are the industry profits, π, less taxes, bribes, and contributions, T. This means that profit changes, holding producer returns constant, will have a positive effect on the potential tax base, while changes in producer returns, holding profits constant, will be negatively related to tax receipts.

The untaxed profit function is given by demand and costs,

$$\pi = \pi(P,C), \tag{4}$$

where C is operating cost (excluding all costs included in T). We make the standard assumption $\pi_P \leq 0$, $\pi_{PP} < 0$, and $\pi_C < 0$.

Discussion and Summary

The constraint imposed in (3) together with (4) has several implications. First, movements along any profit function due to price changes are trade-offs of producer for consumer support. These Peltzman-style price adjustments cause profits to change which then must be split between R, producer returns, and T, gains to the regulator. Second, at any chosen price there is a division of the profits between the industry, R, and the regulator, T. The regulator also faces a Niskanen-style trade-off between direct financial support for his bureau versus political support from producers.

We stress again that the similar treatment of bribes and taxes in this formulation is primarily to simplify the notation and manipulations. Bribes, taxes, and contributions could be entered as separate arguments into the wealth function without altering the major results. It is useful, however, to view contributions as a purely privatized tax system which may be levied on producers or consumers without the legal or statutory authority of the state. The only difference between taxes and bribes or contributions in our formulation is that since bribes and some contributions are illegal, an additional cost is imposed on the regulators' probability of acquiring or retaining his office.

The impact of an illegal inducement on the regulators' wealth is straightforward. In the case of a tax or special fee on producers, the link to regulator's wealth stems from the expansion of the regulatory agency.[3] However, the assumption in our model does not require budget-maximizing behavior but only that there are gains to the regulator/legislator from larger tax receipts. For example, apart from the familiar Niskanen-Tullock type arrangements, the link between tax receipts and regulator wealth might be thought of as providing the politician more autonomy (Landes and Posner 1975). Alternatively, larger agency budgets may offer expanded opportunities for hiring campaign workers or for paying off old election favors; for example, the patronage or spoils system argument developed in Stigler (1971) and Demsetz (1977).

Finally, we note that the distinction between conflicts of interest and taxes or bribes is simply that the interest conflicts or revolving doors are analogous to a profit-sharing arrangement between producers and the regulators and, as such, will not increase producer expenses.[4] Bribes or taxes, on the other hand, will reduce the aggregate level of producer returns, *ceteris paribus*. This in turn will reduce campaign support by the producers. The regulator thus faces a profit possibilities frontier for various industries, and his choice problem is one of trading off these profit possibilities between building a majority of electoral support versus direct pecuniary gains from taxes, bribes, campaign contributions, or conflicts of interest.

The regulator's indirect wealth function is formed in (5) by substituting equations (2)–(4) into equation (1).

$$W = W\{M[P,\pi(P,C)-T,T],T\} \tag{5}$$

The Regulator's Decision Variables and Choices

The decision maker maximizes W by controlling price and choosing a tax. The first order conditions for a wealth maximum with respect to P and T are

$$W_M(M_P+M_R\cdot\pi_P) = 0 \tag{6}$$

and

$$W_M(-M_R+M_T) + W_T = 0. \tag{7}$$

Equation (6) depicts changes in the regulator's wealth as he moves along the profit frontier by changing price, whereas equation (7) picks up the wealth effect of changing the tax for a particular point on the profit frontier (given a constant regulated price). In effect (7) measures the pure producer burden of a tax in the sense that increases in the gains to the regulator squash the producer returns function below the profit frontier at every price.

Comparative Regulator Behavior: Three Cases

Born to Run

For illustrative and comparative purposes, we first examine the outcome of this decision problem for the case where the regulator's only goal is election or reelection. This is the situation formally modeled by Peltzman (1976) and can be treated as a special case of our formulation. With the possibility of bribery, taxation, and conflicts of interest eliminated, all profits accrue to producers as returns. That is, assuming no taxes, (6) yields the solution

$$\pi_P = [W_M\cdot(-M_P)]/[W_M\cdot(M_R)], \tag{8}$$

which is identical to the result obtained by Peltzman (1976) using similar assumptions and a slightly different formulation of the optimization problem. Since $(-M_P)$ and M_R are both positive, the important conclusion which emerges from the strict majority maximization objective is that $\pi > 0$; which means that the political equilibrium will not yield that price which maximizes producer returns which, in this initial case, are equal to profits. In Peltzman's words,

> even if a single economic interest gets all the benefits of regulation, these must be less than a perfect broker for the group would obtain. The best organized cartel will yield less to the membership if the government organizes it than if it were (could be) organized privately. This principle is independent of organization or campaign costs, but rests on the heed the political process must pay to marginal opposition. (Peltzman, 1976, p. 217)

In other words, pure producer-protection ($\pi_P = 0$) can only be predicted in the majority maximization case (equation 8) if there is no consumer opposition to price increases, which would require that $M_P = 0$.

If $W_M = 0$ and election/reelection is not valued by the regulator, the outcome is unpredictable, which reflects one limitation of the strict majority maximization approach. This drawback presents an obvious dilemma; as regulators become more removed from elective politics (for example, closer to the end of their careers as elected officials) do their choices vis-à-vis prices, taxes, and producer returns become systematically biased toward producer profit maximization?[5]

One advantage of the objective function postulated in (5) is that we can evaluate this critique of the strict majority maximization approach. To reiterate, the solution presented in (8) for majority maximization is only a special case that can be broadened to examine more general versions of the regulator's objective function. In the cases below we explore the limits to the generality of this first principle, posit several additional principles, and investigate how the various interest groups fare under different regulatory settings.

Beyond Majority Generation: Conflicts of Interest and Revolving Doors

We now consider the outcome of the regulator's choice problem when his decision is influenced by a conflict of interest in addition to an election aim. Specifically, we now postulate that the decision maker is a member of the regulated group and so his wealth depends directly upon π. In the simplest conflict of interest case, we assume that there are no costs stemming from government, no taxes, no bribes, nor any campaign contributions. This means that the regulator's general objective function (equation 1) reduces to $W = W(M,\pi)$. The regulator values larger majorities, and he is simultaneously a member (present or future) of the regulated producer group, but this membership imposes no cost on the producer group. The solution in this setting is

$$\pi_P = [W_M \cdot (-M_P)]/[W_m \cdot M_R + W_\pi], \tag{9}$$

where W_π is the extent of the conflict, as it is the regulator's pro rata share of producer group's returns. The sign of π_P in (9) obviously depends upon the values of W_M, $-M_P$, M_R, and M_π which are all positive.

The surprising result in (9) is that $\pi_P > 0$, or that profit-maximizing prices will not emerge even in the presence of conflicts of interest, or profit sharing between the producer group and the regulator. This means that even if the regulator has direct claim to a share of the profits of the producer group which he regulates, the price he selects in maximizing his wealth is not the price which would coincidentally maximize producer profit. It is worth emphasis that this result in (9) does *not* depend on the possible illegality of conflicts of interest. Even if it is not feasible to police laws against conflict of interest and revolving doors, π_P is predictably positive.

Comparing this result in (9) with the strict majority maximizing solution in (8), we see that (for given values of W_M, M_R and M_P) π_P will be smaller, regulated prices higher, and producer returns greater in the conflict of interest case than in the simple majority maximization case. In effect, the conflict of interest (or the potential for profit sharing) has raised the price of heeding consumer opposition.

Equation (9) offers a continuous characterization of the distance between the wealth-maximizing choice of the regulator and the top of the profit hill. This distance, for a given majority-generating function, depends upon the extent of the regulator's interest conflict or the discounted present value of his pro rata share of producer profit. While the regulator would be willing to trade off some degree of majority support or risk of defeat in exchange for his pro rata pecuniary share of the producer profit, the principle enumerated by Peltzman holds so long as election/reelection has a positive contribution to the regulator's wealth at the margin, that is, $W_M > 0$. Unlike the solution presented in (8), however, for the case of conflicts of interest if $W_M = 0$, the predictable solution (from equation 9) is that $\pi_P = 0$ or that producer returns are maximized when the regulator does not seek reelection. This suggests that "lame duck" regulators are more attractive targets for profit-sharing offers from producer groups.[6]

Given the existence of conflicts of interest, when concern for generating a majority of voter support becomes a less important objective with respect to the wealth of regulators, the more nearly regulated prices will approach profit-maximizing levels. The degree of concern for the support of an electoral majority is presumably established by numerous institutional factors; for example, the appointment of regulatory commissioners versus direct election by constituents, term lengths, mandatory limitations on succession rights, entry barriers in the competition to obtain regulatory offices, and simply approaching the end of a career in elective politics.[7]

Two additional insights are offered by the solution to the conflict of interest case presented in equation (9). First, regulators are more likely to establish profit sharing or conflict arrangements with those producer groups who can offer relatively more electoral support. This is because of the feedback effect of increased profits on regulator wealth through $W_M M_R$, that is, regulator wealth is not only increased through higher profits because of the sharing arrangement (W_π), but also because higher profits mean more electoral support from the cohorts in the producer group. While profit sharing unambiguously results in a reduction in majorities (relative to the no-conflict case, in equation 8), this reduction is dampened since more producer support will be forthcoming. The greater the incremental level of producer support, M_R, the smaller is the wealth loss through W_M for a given level of profit sharing. Stated in the reverse, a larger (absolute) share of producer returns would be required of less politically powerful producer groups (and hence they would be less likely to go along with the sharing arrangement) in order to compensate the regulator for his relatively greater losses in terms of electoral

support. This means that for any given value of W_M, as the electoral strength of a producer group increases, the more attractive it becomes for a conflict of interest type involvement with regulators. Second, equation (9) suggests that the recent proposals to impose a longer time period between employment as a regulator and subsequent employment in the related industry (that is, the revolving door effect) have predictable implications. As W_π must be discounted further into the future its present value falls thus increasing π_P, which means that prices would tend away from their profit-maximizing levels toward the competitive level.

The Effect of Taxes, Contributions, and Bribes

We now examine the regulator's decision problem when his wealth may be enhanced indirectly through general taxation (and hence budgetary expansion) or directly through the collection of campaign contributions or bribes from producers in exchange for higher prices. To avoid unnecessary complications we do not permit any conflicts of interest. The combination of equations (6) and (7) again allows us to express the solution to the regulator's optimization problem as

$$\pi_P = [W_m \cdot (-M_P)]/(W_M \cdot M_T + W_T). \tag{10}$$

In the case of bribes especially, but also illegal campaign contributions, M_T may be larger than in the simple case of taxes. There may be cases, when all tax revenues accrue to the state treasury or when the campaign contributions are legal, that correspond to $M_T = 0$, or, perhaps, even when M_T is positive. In this second case some voters will *encourage* a regulated-monopoly solution with all rents taxed away, as this will reduce or substitute for their own tax liabilities. This result paves the way for a perverse regulatory outcome. Politically weak producer groups may be the target of regulation. By cartelizing the industry, price is raised above marginal cost and a regulatory rent is generated which subsequently can be taxed away to provide the state or the regulators with added revenue. This will be most perverse where the consumers of this good are also politically inept.[8]

Hence we expect not only small, powerful producer groups to be the subject of regulation but large, weak industries as well. If M_T is sufficiently negative, that is, if there is large voter opposition to bribes or contributions (or, more precisely, if $W_M \cdot M_T + W_T = 0$), then the solution to equation (10) is undefined, and we cannot predict what the regulator will do. As M_T becomes less negative, then π_P grows, which indicates that price is falling. This means that if voters are less alienated by overfed bureaucracies than they are by an equivalent level of industry expenses on bribes and campaign contributions, then we predict that industries which bribe or make campaign contributions will have higher product prices than industries that pay the same amounts in taxes, even if *all* these taxes support bureaucracy, other things the same. Of course, if voters are generally not concerned with the honesty of their elected

officials, then they will see a dollar spent on bureaucracy in the same light as a dollar spent on bribes or on campaigning. In this event M_T is not influenced by the taxes-bribes issue, and equation (10) is the same for both cases. This last situation suggests that stricter laws or tighter enforcement of existing laws governing illegal activity among regulators will not necessarily affect their wealth decisions as might first be imagined, but that such laws would increase the attractiveness of levying general taxes.

More generally, this provides a clear rationale for why regulators who have the power to regulate prices and entry would also seek to acquire taxation authority over the regulated industry—the regulators could never be worse off and could obviously be made better off. Perhaps not so obvious, however, are the related inferences from our model concerning the incentive for merging or coordinating the price-setting authority with the power to set tax rates and the type of tax that will be employed. First, consider a situation where tax revenues are raised by other than lump-sum charges (per unit or ad valorem taxes for example). If taxes and prices are fixed independently, the gains to the regulator will be lower than when they are solved simultaneously, as in our formulation. This means that for any given tax, if the firm is allowed to optimize with respect to the price variable, this price will, in general, diverge from that price which the wealth-maximizing regulator in our model would have set.

Consider the example in figure 1. As a reference point, suppose the optimal solution from the standpoint of the regulator who can fix price and the tax rate is to select price p^0 and tax rate t, yielding a tax revenue of T. Compare this solution to one which arises when the regulator can set tax rates but does not have price setting authority. Given tax rate t, in the absence of a regulated price, the monopoly firm or cartelized industry would choose price p^2, which would result in total tax receipts of T' less than T.[9] A more realistic variation of this point is where two separate governmental units (for example, the legislature and a regulatory commission) have each been delegated the independent authority to control one decision. Without cooperation and trade, the separate objective functions or targets of the respective units are likely to result in a nonoptimal (from the separate regulators' wealth- or vote-maximizing view) solution. In short, there is a potential gain to governmental decision-making units from merger, that is, for one political unit to assume authority for setting both tax and price.[10] By the same argument, we would predict that where these decisions have not been merged or coordinated tax revenues are more likely to be raised by lump sum charges or fees rather than by per-unit taxes.

A final word on the tax and bribery solutions from (10). Note that when either $W_M = 0$ or $M_P = 0$ (that is, when regulators do not seek election/reelection or when consumers do not influence elections), the profit-maximizing price will be set. In the former case (when $W_M = 0$), all profits would be extracted through bribes, contributions, or taxes. In the latter case, $M_P = 0$ and $W_M > 0$, the profits would be split between producer returns and

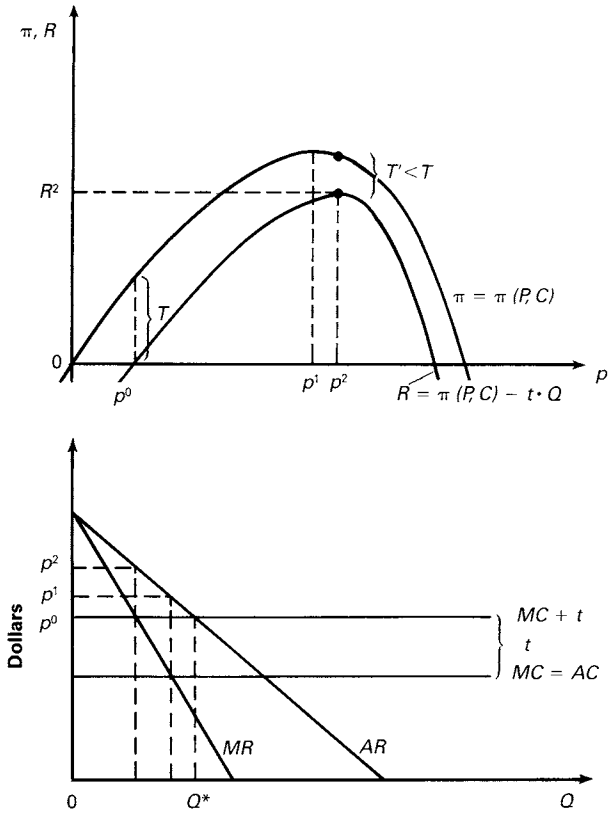

Fig. 1. t = tax rate; p = price; T = tax revenue; R = regulated price

tax revenues. The former case is of interest because it is precisely analogous to the Tullock (1967) and Posner (1975) rent-seeking models of monopoly regulation. The Tullock and Posner models suggest that the cost of obtaining or maintaining a monopoly will be roughly equal to the expected profit of being a monopolist (Posner 1975, 809). This special case, where $W_M = 0$, is especially interesting because of the nature of the rent-seeking costs or excess burden of the regulation. Because the monopoly rents are all taxed away, there is no lobbying or rent-seeking behavior to acquire the monopoly privilege.[11] To repeat the earlier discussion, the regulators select a politically weak industry to regulate, cartelize, and tax. Having taxed away all the monopoly rents, the rent-seeking costs will only be those expended by nonproducers in quest of the tax revenues. We reiterate our earlier suggestion that a two-on-one perspective of the regulatory process may be misleading.

As a final note on the general perspective, postregulatory employment through the revolving door technique is one convenient "tax" method used by regulated industries to compensate politicians for service rendered. To the extent that these individuals are paid in excess of their marginal products, a

tax is being levied on the industry and the revolving door effect reduces to a legal means of influencing the regulatory outcome in the same fashion as bribes or campaign contributions.

Some Evidence

In support of our theory we present evidence from two different regulatory settings. Namely, we examine the effects of the institutional structure of public utility commissions on rates of return and prices of regulated gas and electricity producing firms across states in the United States. A straightforward implication of our model equation (8) is that when election or reelection becomes a less important aspect of the regulator's optimization problem, his choices will tend to favor higher regulated prices—and hence an upward movement along the profit or tax frontier—which will be divided in some proportion between higher producer returns and higher tax revenues or bribes.

There are two different procedures for choosing members of public utility commissions across states. Most states allow the governor or the legislature to appoint the members of public utility commission, but in a few states these regulators are chosen by a direct election of the registered voters. Table 1 lists the states, their method of appointment, and the allowable rates of return for electric utilities in 1966–67. Data for several states are missing due

TABLE 1. Rates of Return for Electric Utilities: 1967

State	Rate of Return	State	Rate of Return
	Regulators Chosen by Direct Election		
Arizona	6.5%* (5–8%)	Montana	5.3%
Georgia	6.0	Oklahoma	6.125 (6–6.25)
Louisiana	6.0	Tennessee	6.0
	Regulators Chosen by Governor or Legislature		
Alaska	7.0%	New Hampshire	6.5% (6–7%)
California	6.26 (5.75–6.76%)	Ohio	5.75 (5.5–6.0)
Colorado	6.35	Pennsylvania	5.9
Connecticut	6.0	Rhode Island	6.0
Delaware	6.5	Utah	6.15
Hawaii	6.5	Vermont	6.11
Idaho	6.1	Virginia	6.375 (5.75–7)
Illinois	5.85	Washington	6.1
Maryland	6.25	West Virginia	6.25 (6–6.5)
Michigan	6.425 (6–6.85)	Wisconsin	6.0
Nevada	6.85 (6.7–7.0)	Wyoming	5.6

Source: State Utility Commissions 1967.

Note: Data in parentheses are the range of legally prescribed rates of return. Where such a range was presented, we chose the midpoint as our datum.

to the reporting procedures. We cannot determine if missing data are strictly missing data or if it represents the absence of rate of return restrictions.

The first hypothesis is that where regulators are selected (appointed by legislature/governor) rather than elected, rates of return, rate bases, and profits will be higher. Consumer-voter input to the price-setting process is less direct since the regulators are one step removed from elections.[12] In other words, when regulators are selected as opposed to elected, $-M_P$ and W_M will be closer to zero, and regulated producer returns will be predictably higher. The mean rates of return for utilities in directly elected and legislatively/gubernatorially selected states are 5.99 and 6.22, respectively. The test statistic is t=1.45, which is significantly different from zero at the 10 percent level using a one-tailed test.[13] We interpret this difference in rates of return as supportive of the argument that when regulators are appointed, as opposed to elected directly, the relative importance of consumer-voter opposition to regulated prices is diminished and, hence, we would expect to observe higher returns in the regulated firms.[14]

We also have data for 1980 allowed rates of return.[15] For the appointed states the average allowed rate of return is 14.38 percent. On the other hand, the elected commissions allowed an average of 13.89 percent return on equity. The t-statistic is 1.42 which is significant at the 10 percent level using a one-tailed test.[16]

Stigler and Friedland (1962) and Jarrell (1978) have examined the impact of regulation on electricity prices. Peltzman (1971) has compared the pricing practices in public versus privately owned utilities, and Meyer and Leland (1980) have predicted unregulated prices to assay the effectiveness of regulation. However, none of these studies examines the differential impact on prices as the method of selecting regulators varies. As we noted earlier there should be an inverse relationship between regulated prices and the importance attached to election/reelection by the regulator. For this reason we reiterate our hypothesis that in states where public utility regulatory commissioners are chosen in a general election we will observe cheaper prices.

The means of average price, average residential price, and average industrial price are reported in table 2 by each class of regulatory commission, appointed and elected for 1967. We observe that average residential prices of electricity are marginally statistically significantly lower in the states with directly elected regulators. Overall, prices and industrial prices are lower, but not in a statistically reliable sense.

For gas prices we find that overall price, industrial price, and residential price are all lower in states with directly elected regulators. Deleting Texas and Louisiana from the sample, with appointed and elected commissions respectively, does not alter the results. However, these results should be interpreted with caution. Factors other than commission selection influence price, and although the averaging technique may take account of such differences, there can remain systematic effects correlated with commission selection which may account for these results. For example, in the case of natural gas, transmission costs can drastically affect price.

TABLE 2. Average Prices: 1967

	Average Price		F-Statistics	t-Statistics	
	Appointed Commissions	Elected Commissions	(= variances)	(= means)	*N*
	Electricity Prices				
Overall	1.69¢/kwh	1.58¢/kwh	1.49	0.73	48
Industrial users	1.43¢/kwh	1.36¢/kwh	1.66	0.51	36
Residential users	2.32¢/kwh	2.07¢/kwh	1.25	1.56*	12
	Natural Gas Prices				
Overall	0.927$/MMBTU	0.489$/MMBTU	25.61**	4.13**	48
Industrial prices	0.699$/MMBTU	0.372$/MMBTU	30.61**	4.00**	36
Residential prices	1.30$/MMBTU	1.01$/MMBTU	1.76	1.46*	12

*Significant at the 10 percent level, one-tailed test.
**Significant at the 1 percent level, one-tailed test.

To control for the other factors that might systematically affect price we used the following three-equation model of electricity price, gas price, and commission selection:

$$P_E = a_0 + a_1 COMM + a_2 P_G + a_3 YPC + a_4 POP + a_5 CAP + a_6 FC + a_7 LF + a_8 EXP + u_1 \quad (11)$$

$$P_G = b_0 + b_1 COMM + b_2 P_E + b_3 YPC + b_4 POP + b_5 RES + u_2 \quad (12)$$

$$COMM = c_0 + c_1 P_E + c_2 P_G + c_3 YPC + c_4 POP + c_5 DEN + c_6 SIZE + c_7 RATIO + u_3 \quad (13)$$

where

P_E = log of the average price of electricity,
P_G = log of the average price of natural gas,
$COMM$ = dummy variable, 0 if appointed, 1 if elected,
YPC = log of income per capita,
POP = log of population,
CAP = log of installed electric generating capacity per plant,
FC = log of net fuel cost per kwh produced,
LF = log of load factor (generation/capacity),
EXP = absolute value of export ratio,
RES = log of proven natural gas reserves,
$SIZE$ = log of size of state legislature,
$RATIO$ = ratio of house to senate size, and
u_1, u_2, u_3 = error terms.

Equation (11) posits that the price of electricity is a function of the method of commission selection; the price of a substitute, natural gas; income per capita and population as demand shifters; and capacity, fuel cost, load factor, and exports as supply shifters. Capacity per plant will measure the effect of economies of scale that may exist. Fuel cost and load factor control for input costs and exports measures the effect of selling to out-of-state voters. Higher load factors imply higher operator capital utilization and hence lower prices. Higher exports are expected to be associated with higher prices because local regulators are less concerned about the welfare of foreign-disenfranchised consumers.[17] Equation (12) predicts that the price of natural gas is a function of the method of commission selection, the price of electricity, income, population, and a proxy for the cost of natural gas transportation. Presumably natural gas reserves are negatively correlated with transportation costs. Hence we predict that the sign on this coefficient will be negative.

Equation (13) argues that not only does the method of commission selection affect regulated prices, but that the level of utility prices also affects how the state determines the institution to regulate prices. In those states with high prices consumers demand more control over the regulatory process. Consequently we expect that the higher the natural gas and electricity prices the more likely a state is to have elected regulators. Of course, if competition or other forces are already assuring low prices then consumers have little demand to control the price-setting process. It is sort of like the question of do neighborhoods with many locks have high or low crime rates. This makes the signs on the prices of electricity and natural gas ambiguous. Income, population, density, and institutional factors are also included. Larger legislatures are more likely to have elected commissions because large legislatures have bigger organization and control costs. The same explanation suggests that high-ratio states are more likely to have elected regulatory commissions.[18]

Simultaneous estimation of the system allows us to capture all of these effects jointly.[19] The three-stage-least-squares estimates of equations (11) and (12) are reported in table 3.[20] The results are mixed.[21] Commission selection is not significantly associated with electricity prices, but elected commissions are systematically related with lower natural gas prices. The F-statistic on the equality of the *COMM* coefficient across the two price equations is 7.04 which is significant at the 1 percent level. This suggests that the impact of commission selection is not the same for electricity and natural gas which is not surprising since the producer and consumer groups are different in the two cases.

Summary and Conclusions

In this article we attempt to merge the theory of bureaucracy with the theory of regulation. The results hold new predictions about the pattern of regulation. For example, producer groups who offer politicians strong electoral support (for example, by sharing the gains with labor who in turn vote accordingly)

TABLE 3. Electricity and Natural Gas Price Regressions (3SLS estimates)

Variable	Parameter Estimate	Standard Error	t-Ratio	Approx. PROB > |t|
	Electricity Price Equation			
INTERCEPT	−1.767434	1.520818	−1.1622	0.2522
COMM	0.056568	0.076037	0.7440	0.4614
LINGASP	0.157450	0.064463	2.4425	0.0192
LNYPC	0.414136	0.196099	2.1119	0.0412
LNPOP	0.103181	0.039016	2.6446	0.0117
LNCAPP	−0.161547	0.039718	−4.0674	0.0002
LNFC	0.156240	0.037391	4.1786	0.0002
LNLF	−0.249336	0.171811	−1.4512	0.1547
ABSEXP	0.254314	0.102272	2.4866	0.0173
	Gas Price Equation			
INTERCEPT	1.267385	2.664008	0.4757	0.6367
COMM	−0.36457	0.131403	−2.7744	0.0082
LNP	0.552940	0.170877	3.2359	0.0024
LNYPC	0.240028	0.356512	0.6733	0.5045
LNPOP	−0.00156447	0.053704	−0.0291	0.9769
LINGASRES	−0.040751	0.008333991	−4.8897	0.0001

Sources: Edision Electric Institute, *Statistical Yearbook*, 1967. *State Utility Commissions*, 1967. *Statistical Abstract of the U.S.*, 1968. *Book of the States*, 1968.

are preferred over producer cartels who only offer bribes. In addition, we observe a strong theoretical propensity for the regulatory process to house its taxing and control functions under one roof. And finally, in the Tullock and Posner rent-seeking models of political behavior the regulated industry is taxed the total benefit of regulation. However, in our model this result is only predicted if politicians do not seek election or reelection.

Practically speaking, we found some evidence that direct election of regulators rather than appointment is associated with lower prices and rates of return for regulated natural gas and electricity prices.

NOTES

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1. This modified approach is suggested by Hirshleifer (1976) in his critique of Peltzman's (1976) model.
2. Stigler (1972, 162–63), for example, portrays this perspective: "Our theory of industry-acquired regulation predicts that the regulatory body will have the character of trustworthy bureaucracy rather than the dangerous potentialities of competitive politics."
3. The connection between the size of an agency's budget and regulator wealth (broadly defined to include pecuniary and nonpecuniary income) has, of course, received extensive analytical and empirical attention. The most familiar examples of this analytical tradition are Niskanen (1971) and Tullock (1965). Some empirical evidence is presented in Crain and Tollison (1976).
4. Stigler (1972) offers some interesting data and additional discussion of the prior and subsequent occupations of the personnel of regulatory commissions. The influence of finite terms of office, and hence the problem of postgovernment employment, has been addressed in Hilton (1972) and Eckert (1973). See also McCormick and Tollison (1981, chap. 5), and Horne (1982).
5. This principle of regulation has not dodged previous criticism, also stemming from the simplifying one-dimensional goal of majority maximization in its roots. For example, Hirshleifer (1976, 241) argues that

   > (I)f wealth is the ultimate goal, majority maximization can only be an instrumental and partial aim. The politician should be willing to accept some risk of defeat in exchange for a sufficient direct or indirect monetary payment.

6. Note, however that the "lame duck" effect may also influence demand for regulator outcomes by special interest groups. As the expected tenure in office of the regulator falls, the expected durability and hence the present value of that regulator's influence may also decline. The importance of long-term durability on the present value of special interest legislation is the central theme of Landes and Posner (1975).
7. This analysis reiterates the importance of mechanisms for controlling the behavior of governmental officials such as discussed in Becker and Stigler (1974) and Barro (1973).
8. For example, they live and vote outside the political jurisdication. For more on this point see Maloney, McCormick, and Tollison (1982).
9. Obviously, if this industry is comprised of a number of firms who cannot privately cartelize output, then price will be p^0 and tax revenues T.
10. Ehrlich and Posner (1974) reach a similar conclusion from a different perspective.
11. To be sure they can rent seek to acquire the tax revenues.
12. In this context we are implicitly assuming that there is an agency cost between elected politicians and their bureaucratic servants. Without this loss of control, voters would through the election of legislators and governors de facto elect the public utility commissioners. Whether there exists an organizational and control problem between legislators and bureaucrats is, of course, an empirical issue. We assume that one exists, which grants a degree of independence to the regulator. The tests that follow are in fact tests of the joint hypothesis that an agency problem exists and that regulators insulated from election tend to favor higher prices.
13. If Montana is deleted from the "elected" data set, then the means are not statistically different. This test is based on the assumption of equal variances across groups. The F-statistic testing the hypothesis of equality is 1.75, suggesting that the variances are equal.

14. Several states either do not have a public utilities commission or relegate that function to some other bureau in the state. Theoretically and empirically, we align those states with the states where the commissioners are appointed either by the legislature or the governor.
15. Saloman Brothers, Stock Research, Industry Analysis, February 17, 1981, reports "recently allowed return on equity" rulings by state regulatory commissions.
16. Again, we have assumed that the variances are equal. The F-statistic is 1.06.
17. See Peltzman (1971), Taylor (1975), Jarrell (1978), and Maloney, McCormick, and Tollison (1982) for further discussion of these variables.
18. See Crain (1979) and McCormick and Tollison (1981, chap. 5) for a detailed discussion of the impact of legislative size and ratio on similar institutional variables.
19. *3SLS* estimation is not efficient because the *COMM* variable is discrete. However, logit estimation of the *COMM* equation separately suggests that this problem is not serious. All the coefficients have the same sign except electricity price, and none change significance levels.
20. Estimates of the *COMM* equation are available on request.
21. Deleting the commission equation does not alter the basic result although the significance of *COMM* in the gas equation is reduced to the 10 percent level.

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